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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

		Application Number	10/708001
		Filing Date	01-31-2004
		First Named Inventor	Ju Young Kim
		Art Unit	1754
		Examiner Name	
Total Number of Pages in This Submission	44	Attorney Docket Number	

ENCLOSURES (Check all that apply)			
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation <input type="checkbox"/> Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s)	<input type="checkbox"/> After Allowance communication to Technology Center (TC) <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input type="checkbox"/> Other Enclosure(s) (please identify below):	.Remarks Enclosures: 1. Petition for Retroactive License (37 CFR 5.25); 2. Petition for License for Foreign Filing (37 CFR 5.14); 3. Verified Statements in support for Petition for Retroactive License (Kim, King, [REDACTED]); 4. Enclosures of references cited in Verified Statements: English Translation Korean Appl. No. KR2003-0064186 + Filing Receipt; Copy of assignment; Web pages for C&S Patent and Law site; CC contract between Dr. Kim and C&S; CC "email 1"; cc "email 2". 5. Associate Power of Attorney (for Patricia Smith King)

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Patricia Smith King
Signature	
Date	17 Aug. 2004

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below.

Typed or printed name	Patricia Smith King		
Signature		Date	17 Aug. 2004

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

13 17 2004
 MAILING OFFICE
 Mail Stop Technology Center 3640
 Commissioner for Patents
 P.O. Box 1450
 Arlington, VA 22313-1450

PETITION FOR RETROACTIVE LICENSE (37 CFR 5.25)

Dear Director of Technology Center 3640,

Petitions for retroactive foreign filing license under 37 CFR 5.25 (MPEP §140) are delegated to the Director of Technology Center 3640 (MPEP § 1002.02(c)(1) paragraph 7). This Petition is therefore being submitted to your attention.

1. Petition

It is respectfully requested that this Petition for License for Foreign Filing attached hereto be granted retroactively under the provisions of 37 CFR 5.25.

Please note that the Petition for License for Foreign Filing requests (a) expedited handling and (b) a telephone report.

CERTIFICATION UNDER 37 C.F.R. sections 1.8(a) and 1.10*
*(When using Express Mail, the Express Mail label number is mandatory;
 Express Mail certification is optional.)*

I hereby certify that, on the date shown below, this correspondence is being:

MAILING

deposited with the United States Postal Service in an envelope addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.

37 C.F.R. section 1.8(a)

37 C.F.R. section 1.10*

with sufficient postage as first class mail.



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 Mailing Label No. ER964468674 US (mandatory)

TRANSMISSION

transmitted by facsimile to the Patent and Trademark Office.

Date: 17 AUG 2004

Patricia Smith King
 Signature

PATRICIA SMITH KING
 (type or print name of person certifying)

2. Material filed abroad without a license

Attached is a copy of the material that was filed abroad without a license for foreign filing. The material comprises the English translation of the Korean patent application no. KR2003-0064186 and attached filing receipt.

3. Identification of inventor(s), title of invention and details of corresponding U.S. application

Inventor(s) name(s): Ju Young Kim

Title of Invention: Lignocellulose-based anion-adsorbing medium (LAM) and process for making and using same for the selective removal of phosphate and arsenic anionic contaminants from aqueous solutions.

In re application of: Ju Young Kim

Application No.: 10/708,001

Group No.: 1754

Filing Date: January 31, 2004

Examiner: none yet assigned

5. Foreign countries and dates of filing of material for which retroactive license requested (37 CFR 5.25(a)(1), (2))

With respect to the material for which a retroactive license is requested, each foreign country in which the patent application material was filed and the date it was filed is as follows:

<u>Foreign Country</u>	<u>Date</u>
Republic of Korea	September 16, 2003

6. Verified Statement(s)

Also attached hereto are the verified statement(s) of:

Ju Young Kim and Patricia Smith King.

which confirm(s) that, in accordance with 37 CFR 5.25(a)(3)(i)-(iii),

- (a) the subject matter in question was not under a secrecy order at the time it was filed abroad, and that it is not currently under a secrecy order;
- (b) the license is being diligently sought after discovery of the proscribed foreign filing; and
- (c) an explanation of why the material was filed abroad through error and without deceptive intent without the required license under Section 5.11 first having been obtained.

7. Fee (37 CFR 1.17(h))

The fee for this Petition for Retroactive License (\$130) plus the extra fee for expedited handling of the enclosed Petition For License for Foreign Filing (\$130) are paid by the attached check for \$260.00.

Date: 17 Aug. 2004

Patricia Smith King
Patricia Smith King
Registration No. 41820

Patricia Smith King
Registration No. 41899
King Research & Law
222 N. Midvale Blvd., Ste. 22
Madison, WI 53705

1-608-231-2988



PATENT

Mail Stop Technology Center 3640
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

**PETITION FOR LICENSE FOR FOREIGN FILING
(U.S. PATENT APPLICATION BEING FILED CONCURRENTLY)
(37 CFR 5.14)**

Please note that this petition requests:

expedited handling.
telephone report.

1. Petition

Petition is hereby made, in duplicate, for a license under 37 CFR 5.12(b), for the foreign filing of the subject matter for which a corresponding U.S. application has previously been filed. A copy of this application is attached hereto to assist in the handling of this petition.

It is requested that the duplicate copy of the petition be returned with the license or other action on the petition.

2. Identification of inventor(s), title of invention and short statement as to the nature of the invention

Inventor(s) name(s): Kim, Ju Young

Title of invention: Lignocellulose-based anion-adsorbing medium (LAM) and process for making and using same for the selective removal of phosphate and arsenic anionic contaminants from aqueous solutions.

It is believed that this invention is clearly of no interest from a security standpoint, as it relates to:

A lignocellulose-based anion-adsorbing medium (LAM) and process for making and using same for the removal of phosphate and arsenic anionic contaminants from aqueous solutions. The invention's applications are in the field of environmental clean-up of contaminated waters.

3. Expedited handling (37 CFR 1.17(h))

Expedited handling of this petition for license is requested.

(Petition for License for Foreign Filing (U.S. Patent Application Filed Previously)--page 1 of 2)

08/19/2004 WAB0ELR1 000000128 10708001
02 FC:1460
130.00 op

Enclosed is a check in the sum of \$130.00 (please note: actual amount of check is \$260 to additionally cover fee for filing the enclosed Petition for Retroactive License).

4. **Telephone notification of issuance of license**

Please notify petitioner of the issuance of the license, by telephone, at the number shown below.

Date: 17 AUGUST 2004

Patricia Smith King

Patricia Smith King
Registration No. 41899
King Research & Law
222 N. Midvale Blvd., Ste. 22
Madison, WI 53705

1-608-231-2988



PATENT

Mail Stop Technology Center 3640
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

**VERIFIED STATEMENT IN SUPPORT OF
PETITION FOR RETROACTIVE LICENSE (37 CFR 5.25)
By Dr. Ju Young Kim**

I, Ju Young Kim, am a citizen of the Republic of Korea and inventor of the subject matter disclosed in U.S. Application 10/708,001 and related Korean Application no. KR2003-0064186, which are at issue in the enclosed Petition for Retroactive License under 37 CFR 5.25.

I am the only person besides my Korean counsel, having personal knowledge of the acts regarding filing in the foreign country, namely the Republic of Korea, during the period leading up to and including the Korean filing. As such I am the appropriate person to make this Statement in support of the Petition showing facts as to the nature of the error as required under 37 CFR 5.25.

This Statement describes my understandings and the acts which constitute my error without deceptive intent, those acts covering the period leading up to and including the sole proscribed foreign filing as required under 37 CFR 5.25.

1. The subject matter in question was not under a secrecy order at the time it was filed abroad in Korea, and is not currently under a secrecy order. (37 CFR 5.25 (3)(i))
2. The license is being diligently sought after discovery of the proscribed foreign filing. (37 CFR 5.25 (3)(ii))
 - a. I was first informed of the requirement to obtain a foreign filing license for the Korean filing (KR2003-0064186; filed on 9/16/2003) on August 2nd, 2004, when the attorney for the assignee of the related U.S. Application (10/708,001, filed 1/31/2004) first discovered the oversight and informed me of it. The assignee of the U.S. application is an American company, H₂O Technologies, a Limited Liability Company headquartered in Valdosta, Georgia. The attorney I referenced is Atty. John Sinnott, of the law firm of Langdale & Vallotton located in Valdosta, Georgia. Mr. Sinnott told me on August 2nd, that he had just discovered the error while reviewing the file in preparation for a PCT filing.
 - b. Mr. Sinnott also informed my past patent counsel (i.e., from before the invention and patent applications were assigned to H₂O Technologies), Atty. Patricia Smith King, King Research & Law, Madison, WI, on August 2nd, 2004, via a voice mail message. She contacted me on August 3rd to discuss what information I could provide regarding what happened with my Korean patent application. I provided her materials outlined below that night and on August 4th.

- c. I have made every effort to diligently provide whatever was needed for this Petition as quickly as possible once the error was discovered. All of the information I had was provided within 2 days of being informed of the error.
- 3. The material was filed abroad through error and without deceptive intent without the required license under Section 5.11 first having been obtained. (37 CFR 5.25 (3)(iii)).
 - a. I am a citizen of the Republic of Korea and filed the Korean application covering subject matter I invented while resident in the U.S. Though I informed my Korean patent counsel of these facts, they did not inform me of the requirement to first obtain a foreign filing license from the U.S. Patent & Trademark Office. At the time I was having the Korean application drafted and filed, I had no U.S. patent counsel and did not know that a foreign filing license was required.
 - b. I arranged with a Korean patent law firm to draft and to file a patent application in Korea on my invention, the subject matter of which is described in the related filings (US 10/708001 and KR2003-0064186). The firm assured me that they were competent to handle my filing.
 - i. C&S Patent and Law Office, K.P.O. Box 103, Seoul, 110-601, Korea.
Tel: 82-2-2187-7151-9. (see enclosed Web site pages for the firm; www.cnspat.com).
 - ii. The firm assured me that they were competent to handle my case. As their Web site states on the What We Serve page (see enclosed Web site pages for the firm), “Our patent. . . services include drafting patent specifications. . . and filing under various international treaties to establish rights and secure regional protection.” (emphasis added).
 - iii. I worked with two attorneys at that firm, Won Son and Sun-Hwa Lee (see enclosed Web site pages for their profiles).
 - c. Timeline. I worked with my Korean patent counsel on drafting the application while living in Korea during August of 2003. I returned to the U.S. in early September of 2004. The patent application was filed in Korea on 9/16/2003 and was accorded application number KR2003-0064186.
 - i. Enclosed please find a copy of the English Translation of Korean patent application KR2003-00064186 with attached filing receipt.
 - ii. The timeline:
 - 1. 8/12/2003 – I went to Korea for the patent application drafting.
 - 2. 8/14/2003 – 8/27/2003 – I made a draft of the patent application documents and revised the document with Sung-Hwa Lee.
 - 3. 8/28/2003 – I signed the patent application contract with C&S (see enclosed copy of contract in Korean, dated 8/28/03 at top).
 - 4. 8/29/2003 – I received a final draft from Sung-Hwa Lee and I sent back a revised one. (see enclosed “E-mail 1” in Korean with attached English translation).
 - 5. 8/30/2003 – I left Korea to return to the U.S.
 - 6. 9/16/2003 – The Korean patent application was filed in Korea.
 - 7. 9/17/2003 – I received an e-mail from Sung-Hwa Lee confirming the filing (see enclosed “E-mail 2” in Korean with attached English translation).

- d. My error could not have been made with deceptive intent because I was ignorant of the requirement for a foreign filing license. My first U.S. patent counsel, Patricia Smith King, whom I began working with after I'd already filed the Korean application [i.e., from 9/17/2004 until filing the U.S. application on 1/31/2004 and its assignment to H₂O Technologies, LLC, on 4/30/2004 (see enclosed copy of Assignment)] did not inform me of the need to obtain a license to file the Korean patent application. As I stated above, I first learned of this requirement from Atty. Sinnott who is current counsel of record for the related U.S. filing.
- e. I have always intended that the technology be developed in the U.S. and be owned by a U.S. interest, as evidenced by my assignment to the U.S. company, H₂O Technologies, a Limited Liability Company headquartered in Valdosta, Georgia, of "*the full and exclusive right, title and interest to the Invention in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries, to all Letters Patent or similar legal protection in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries to be obtained for the Invention through all United States Patent application number 10/708001 or Republic of Korea patent application No. KR 10 2003-64186, or both, or any continuation, division renewal substitute or reissue thereof or any legal equivalent thereof including but not limited to utility models, industrial models, designs and the like, and further includes any and all improvements or inventions related in any way to the Invention.*" (see enclosed Assignment)

I sincerely apologize for the error in not obtaining a foreign filing license before filing the subject Korean patent application. However, my error was made with no deceptive intent and I am diligently attempting to rectify the error within 15 days of first being informed of it by assignee's patent counsel.

I respectfully request that you grant the enclosed Petition for Retroactive License.

Declaration

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

PLEASE NOTE: COPY OF FAXED SIGNATURE PAGE SIGNED BY DR. KIM IS ATTACHED.

Date: _____

Dr. Ju Young Kim, Inventor
2021 Ascot Way
Tallahassee, FL 32312
Tel: 850-893-5695

d. My error could not have been made with deceptive intent because I was ignorant of the requirement for a foreign filing license. My first U.S. patent counsel, Patricia Smith King, whom I began working with after I'd already filed the Korean application (i.e., from 9/17/2004 until filing the U.S. application on 1/31/2004 and its assignment to H₂O Technologies, LLC, on 4/30/2004 (see enclosed copy of Assignment)) did not inform me of the need to obtain a license to file the Korean patent application. As I stated above, I first learned of this requirement from Atty. Sinnott who is current counsel of record for the related U.S. filing.

e. I have always intended that the technology be developed in the U.S. and be owned by a U.S. interest, as evidenced by my assignment to the U.S. company, H₂O Technologies, a Limited Liability Company headquartered in Valdosta, Georgia, of "the full and exclusive right, title and interest in the Invention in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries, to all Letters Patent or similar legal protection in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries to be obtained for the Invention through all United States Patent application number 10/708001 or Republic of Korea patent application No. KR 10-2003-64186, or both, or any continuation, division, renewal substitute or reissue thereof or any legal equivalent thereof including but not limited to utility models, industrial models, designs and the like, and further includes any and all improvements or inventions related in any way to the Invention." (see enclosed Assignment)

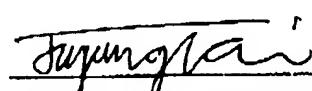
I sincerely apologize for the error in not obtaining a foreign filing license before filing the subject Korean patent application. However, my error was made with no deceptive intent and I am diligently attempting to rectify the error within 15 days of first being informed of it by assignee's patent counsel.

I respectfully request that you grant the enclosed Petition for Retroactive License.

Declaration

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 8/17/2004



Dr. Ju Young Kim, Inventor
2021 Ascot Way
Tallahassee, FL 32312
Tel: 850-893-5695

US 10/708,001

(Verified Statement in Support of Petition For Retroactive
License 37 CFR 5.25 -- Dr. Kim -- page 5 of 5)



Mail Stop Technology Center 3640
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450

**VERIFIED STATEMENT IN SUPPORT OF
PETITION FOR RETROACTIVE LICENSE (37 CFR 5.25)**
By Atty. Patricia Smith King

I, Patricia Smith King, am former U.S. patent attorney for U.S. Application 10/708,001 which is at issue in the attached Petition for Retroactive License under 37 CFR 5.25. I was patent attorney for inventor Dr. Ju Young Kim from 9/17/2004 when we first met for an initial consultation at my office, until he assigned the application to assignee H₂O Technologies, LLC, on April 30th, 2004, whereupon ownership of the U.S. and related patent applications transferred from Dr. Kim to the assignee (see enclosed copy of assignment). Current attorney of record in this case is assignee's attorney, Mr. John Sinnott of the law firm of Langdale & Vallotton located in Valdosta, Georgia.

I do not have personal knowledge of the acts regarding filing in the foreign country, namely the Republic of Korea, during the period leading up to and including the Korean filing because I was not associated with Dr. Kim then. As such I am perhaps not the appropriate person to make this Statement in support of the Petition showing facts as to the nature of the error as I do not meet the requirements under 37 CFR 5.25.

However, this Statement describes my understandings as Dr. Kim's former U.S. patent counsel and is submitted to provide whatever aid possible to the reviewer in their analysis of the Petition.

1. To my knowledge, the subject matter in question was not under a secrecy order at the time it was filed abroad in Korea, and is not currently under a secrecy order. (37 CFR 5.25 (3)(i))
2. The license is being diligently sought after discovery of the proscribed foreign filing. (37 CFR 5.25 (3)(ii))
 - a. I was first informed that a foreign filing license had not been obtained for the Korean filing (KR2003-0064186; filed on 9/16/2003) on August 2nd, 2004, when the attorney for the assignee of the related U.S. Application 10/708,001 first discovered the oversight and informed me of it by phone voice-mail message. The assignee of the U.S. application is H₂O Technologies, LLC, and the assignee attorney I reference is Atty. John Sinnott, current attorney of record for the U.S. application. Atty. Sinnott said he discovered the error while reviewing the file before preparing a PCT application.
 - b. I discussed the matter further with Atty. Sinnott by phone on August 3rd and contacted Dr. Kim to investigate the matter further and to determine what materials he might have regarding the Korean filing. I agreed to prepare the filing materials for the Petition for Retroactive License.
 - c. On August 3rd and 4th I prepared the filing materials for the Petition for Retroactive License. The materials were sent via express mail (ER804576254US) to Atty. Sinnott on August 4th, the second day after being first informed of the error. Atty. Sinnott, as attorney of record for the case, was to then immediately file those materials with the U.S. Patent & Trademark Office.

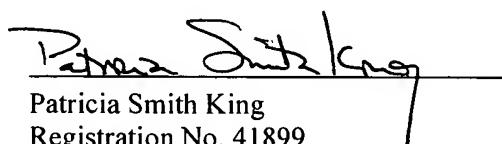
- d. In preparing materials to correct the error within 2 days of its discovery by Atty. Sinnott, all parties including myself, Atty. Sinnott and Dr. Kim have acted diligently.
- 3. The material was filed abroad through error and without deceptive intent without the required license under Section 5.11 first having been obtained. (37 CFR 5.25 (3)(iii)).
 - a. Dr. Kim alone arranged for the drafting and filing of the Korean patent application, all of which was done prior to my retention as his U.S. patent counsel on 9/17/2004 (when we met for the first time to discuss his case). It was his, and/or his Korean patent counsel's, responsibility to have obtained a foreign filing license prior to filing in Korea. The Korean patent firm (C&S Patent and Law) simply failed to obtain the license due to error without deceptive intent (see enclosed Statement from Dr. Kim). The patent application was filed in Korea on 9/16/2003 and was accorded application number KR2003-0064186. A copy of the English translation and filing receipt is enclosed.
 - b. My error in not realizing that a foreign filing license had not been obtained on the Korean filing was without deceptive intent. I did not have the Korean filing materials in my possession (except for the English translation of the KR application) and simply missed the error, else I would have filed a Petition for Retroactive License on Dr. Kim's behalf prior to my filing the related U.S. patent application.
 - c. I verify that Dr. Kim intended that the technology be developed in the U.S. and be owned by a U.S. interest, as evidenced by his assignment to the U.S. company, H₂O Technologies, a Limited Liability Company headquartered in Valdosta, Georgia (see enclosed Assignment). I helped Dr. Kim negotiate that agreement.

I sincerely apologize for my oversight in not realizing that a foreign filing license had not been obtained by the Korean patent counsel. However, I believe that the error by the Korean patent counsel was made with no deceptive intent and I am diligently attempting to rectify the error within days of being informed of it by assignee's patent counsel. As stated above, I have prepared the necessary Petitions and related paperwork for assignee's counsel in order to help ensure a speedy review and grant of the Petition. I respectfully request that the Petition for Retroactive License be granted.

Declaration

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 8/4/2004



Patricia Smith King
Registration No. 41899
King Research & Law
222 N. Midvale Blvd., Ste. 22
Madison, WI 53705
Tel: 608-231-2988
Customer No.: 22224



PATENT

**Mail Stop Technology Center 3640
Commissioner for Patents
P.O. Box 1450
Arlington, VA 22313-1450**

ENCLOSURES REFERENCED IN:

**VERIFIED STATEMENTS IN SUPPORT OF
PETITION FOR RETROACTIVE LICENSE (37 CFR 5.25)**

1. English Translation of Korean patent application KR2003-00064186 with attached filing receipt.
2. Web site pages for C&S Patent and Law firm.
3. Copy of contract between Dr. Kim and C&S Patent and Law dated 8/28/03 (in Korean).
4. Copy of "E-mail 1" from Sung-Hwa Lee to Dr. Kim (in Korean with attached English translation).
5. Copy of "E-mail 2" from Sung-Hwa Lee to Dr. Kim (in Korean with attached English translation).
6. Copy of Assignment of invention and related US and KR patent applications by Dr. Kim to assignee, H2O Technologies, LLC.



별첨 사본은 아래 출원의 원본과 동일함을 증명함.

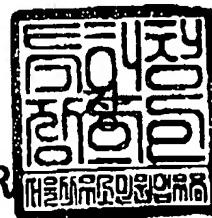
This is to certify that the following application annexed hereto
is a true copy from the records of the Korean Intellectual
Property Office.

출원번호 : 10-2003-0064186
Application Number

출원년월일 : 2003년 09월 16일
Date of Application SEP 16, 2003

출원인 : 에이치투오 테크놀로지스 엘엘씨
Applicant(s) H2O Technologies, LLC

2004년 07월 03일



특허청

COMMISSIONER

관련번호 제 00538 호

출원사실증명원
CERTIFICATE OF APPLICATION

출원인 Applicant	성명 Name	김주영 KIM JU YOUNG	주민번호 Residence No	640305-1001617
	주소	서울특별시 마포구 성산동 214-44 (375)	전화번호	02-2187-7151
대리인	성명	특허법인씨엔에스	대리인 코드	9-2003-100065-1
	주소	서울특별시 강남구 도곡동 467-6 대림아크로월 2306호 특허법인 C&S		
출원번호 Application Number	특허-2003-0064186 PATENT-2003-0064186	출원일자 Filing Date	2003년 09월 16일 SEP 16, 2003	
발명(고안)의 명칭, 의장물 표현 및 물품, 상품(서비스업)류 구분	제거 또는 말루미늄 결합 리그노셀룰로즈 이디아 제조방법 Manufacturing Method of Lignocellulose Media Coupled with Fe or Al			
제작 Title of Invention, Product(s) Embodied in Design, or Classification of Mark				
용도 Purpose	확인용 For Confirmation			

위 사실을 증명함.

This is to certify that the above applicant has filed as stated in this
certificate at the Korean Intellectual Property Office

English Translation:

Title: Manufacturing method of lignocellulose media coupled with Fe or Al.

Korean Patent Application No.: KR-10-2003-0064186; Filed: 16 September 2003;

Applicant: Ju-Young Kim.

□SUMMARY□

This invention is about a way of manufacturing lignocellulose media, which has replaced hydrogen in OH-, attached to cellulose(C₆H₁₀O₅) and lignin(phenyl propane, C₆-C₉), with Fe or Al. This invention involves the following three steps: 1) Dissolve a chemical compound containing Fe or Al in water, and then dissociate the Fe or Al by adding acid. 2) Absorb Fe or Al by adding lignocellulose in the above solution. 3) From the above lignocellulose which has absorbed Fe or Al, replace H in OH-, which is attached to cellulose and lignin, with Fe or Al, using a fixing solution or fixing gas.

By this invention, the absorption capacity is much higher than that of other currently used media, and so it can effectively remove arsenic in underground water and mine wastewater as well as phosphate in sea water, freshwater, and sewage. In addition, by the regeneration method suggested in this invention, the lignocellulose media can be regenerated to its original absorption capacity as well, which can lead to great cost effectiveness.

□Index□

lignocellulose, cellulose, lignin, Fe, Al, phosphorus (or phosphate), arsenic

□Specifications□

□Name of the invention□

Manufacturing Method of Lignocellulose Media Coupled with Fe or Al

□Brief Explanation of the Figures□

Figure 1 shows the results of the absorption experiment of non-pelletized lignocellulose media in the distilled water and artificial sea water.

Figure 2 shows the results of the absorption experiment of pelletized lignocellulose media in the distilled water and artificial sea water.

□Detailed Explanation of the Invention □

□Purpose of the Invention□

□Technology the Invention Belongs to and the Current Technology of that Field

This invention is about a manufacturing method of lignocellulose media (hereinafter referred to as Lignocellulose Media Coupled with Fe or Al) which has replaced H in OH-, attached to cellulose and lignin, with Fe or Al. More specifically, it is about a manufacturing method of lignocellulose coupled with Fe or Al as media to efficiently remove arsenic in the underground water and mine wastewater as well as phosphate in the sea water, freshwater, wastewater and sewage.

The above mentioned lignocellulose refers to the main components of the plants, including all the materials which have cellulose and lignin in them, such as wood, paper and cotton.

Generally, phosphate in the sea water, freshwater, wastewater and sewage causes water pollution such as a red tide and eutrophication, and arsenic in the underground water and mine wastewater causes direct/indirect pollution and threatens the lives of human beings, animals and plants when using them into drinks. Therefore, there have been many efforts to remove phosphate and arsenic in water.

When using the currently used method to remove phosphate in the sea water, freshwater, wastewater and sewage, it is impossible to cost effectively remove phosphate in case of non point source pollution, where pollutants are drained into wide areas such as rivers and the sea. And as for point source pollution, where pollutants are produced from specific points, such as industrial wastewater or domestic wastewater, many methods have been suggested, such as chemical precipitation, biological treatment, MBR (membrane Bio-coupled Reactor) method, ion exchange and absorption method.

At present ion exchange and membrane method have been suggested as methods to remove arsenic in the underground water and mine wastewater.

The chemical coagulation/precipitation method is widely used in medium/small sized sewage treatment plants. However, there is a disadvantage that when the concentration of

with Fe or Al in order to achieve the goals above. The followings are the three steps of the method: 1) Dissolve a chemical compound containing Fe or Al in water, and then dissociate the Fe or Al by adding acid. 2) Absorb Fe or Al by adding lignocellulose in the above solution. 3) From the above lignocellulose which has absorbed Fe or Al, replace H in OH⁻, which is attached to cellulose and lignin, with Fe or Al, using a fixing solution or fixing gas.

As a way to attain the above mentioned goals, this invention provides a regeneration method of lignocellulose media coupled with Fe or Al which has absorbed phosphate or arsenic. In the regeneration process the lignocellulose media is washed in alkali solution, and then neutralized with acid.

This invention provides lignocellulose media coupled with Fe or Al. The lignocellulose media manufactured by the above described method can be used to remove phosphate in the sea water, freshwater, wastewater and sewage, and the arsenic in the underground water and mine wastewater.

The following is the more detailed explanation of the invention. Lignocellulose media of this invention is manufactured by following steps. First, dissolve a chemical compound in the water which includes Fe or Al. Some examples of the

chemical compounds containing Fe or Al are FeI₂, FeCl₂, FeCl₃, FeBr₂, FeBr₃, FeF₂, FeF₃, Fe₂(SO₄)₃, Fe(NO₃)₃, FePO₄, AlI₃, AlCl₃, AlBr₃, AlF₃, Al₂(SO₄)₃, Al(NO₃)₃, AlPO₄ and so on, and FeCl₃ or AlCl₃ is recommended. The added amount of the chemical compound containing Fe or Al, such as FeCl₃ or AlCl₃, is 0.01 M ~ 3.0 M. Recommended amount is 0.1 M ~ 1.0 M. When the amount is less than 0.01 M, it takes a long time to absorb a certain amount of Fe or Al into lignocellulose. When the amount is more than 3.0 M, on the other hand, Fe or Al gets excessively absorbed into lignocellulose, and produces, in turn, a great deal of extra Fe or Al on lignocellulose surface when fixing Fe or Al to lignocellulose in the next step. It can lead to lower removal efficiency of phosphate or arsenic.

Second, add acid to the solution in which the chemical compound with Fe or Al has been dissolved. This is to help Fe or Al dissociate in the solution, and to prevent the dissociated Fe or Al from associating again, and by doing so, to produce more uniformed Fe or Al solution. HCl, H₂SO₄, HNO₃ can be used as dissociating acid in the solution and HCl is highly recommended. The concentration of the added acid, such as HCl, is 0.1 M ~ 1.0 M. When acid concentration is lower than 0.1 M, acid cannot prevent Fe or Al from associating again. Acid concentration above 1.0 M is needless because 1.0 M of acid is good enough for Fe or Al to

phosphate in sewage/wastewater becomes lower and lower, the removal efficiency is decreased abruptly, and in case of domestic wastewater, the capacity is less than 60 percent. It can also produce a large amount of sludge, which means extra cost, and has another problem as **sludge disposal**.

The currently used biological treatment and chemical coagulation/precipitation method, which is used in medium/large sized sewage treatment plants, are to remove phosphate after biological treatment by adding coagulation chemicals into a settling tank and remove water from the settling tank. Although this has higher phosphate removal efficiency than the chemical coagulation/precipitation method, its screening efficiency is 70-80% at best and the removal efficiency abruptly decreases when the concentration of phosphate in sewage is low. This method produces more sludge than the chemical coagulation/precipitation to causes additional cost and serious problem as **sludge disposal**.

The MBR method, which uses MF(micro filter) or UF(ultra filter), is a method that continuously accumulates phosphate by adding chemical coagulants in the reactor and then cleans the reactor once or twice a year. It has a disadvantage of treating concentrated sludge in the reactor one more time using the sedimentation or other methods.

The semiconductor, electronics, dyeing plants use ion exchange resin method, but it should use pre-treated water and is very costly. Therefore, it can be used only for the special industrial purpose, and so is not appropriate for phosphate or arsenic removal in point/non point source pollution.

Finally, there is a membrane method, which is physical treatment method to remove arsenic using a membrane. It costs much to maintain because it needs NF(nano-filter) and Reverse osmosis process.

□Technological Achievements through the Invention□

The invention is very cost effective water treatment method. Also it is to solve problems of above-mentioned currently used water treatment by providing a method of manufacturing the lignocellulose, a harmless natural material, media that has been coupled with Fe or Al. The advantages of the lignocellulose media are as follows: It can remove arsenic in the underground water and mine wastewater as well as phosphate in freshwater, wastewater and sewage. It has high absorption capacity even in the drinking water resource, of which the pollutant concentration is very low.

□Steps of the Invention□

This invention provides a method of manufacturing lignocellulose media coupled

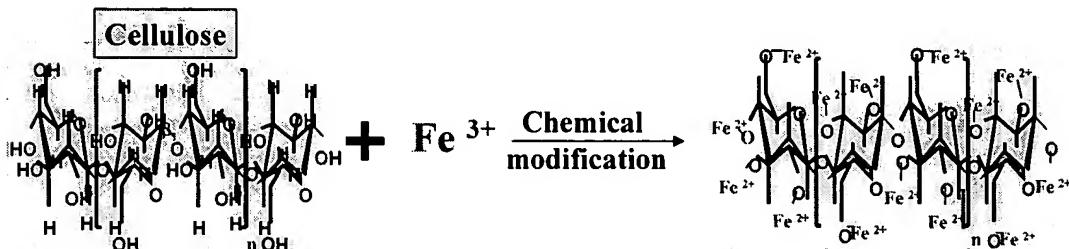
be dissociated.

Add lignocellulose to the above solution with Fe or Al dissociated, let the lignocellulose absorb Fe or Al, and then dry the lignocellulose which has absorbed the above Fe or Al at room temperature. When dried, replace H in OH⁻, which is attached to cellulose and lignin, with Fe or Al by using a fixing solution or fixing gas. The fixing solution or fixing gas are alkali solution or alkali gas. NaOH, KOH, Ca(OH)₂ and NH₄OH are recommended, and NH₄OH solution or NH₄OH gas are most highly recommended.

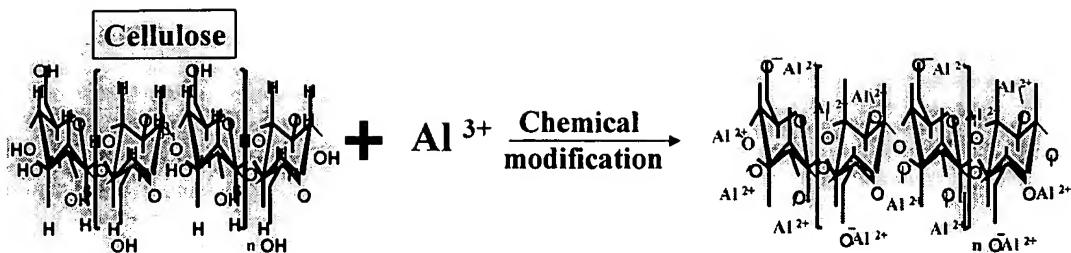
The desirable concentration of alkali solution such as NH₄OH is 1M ~ 8M. Alkali concentration below 1M causes hardly any reaction, whereas, alkali concentration above 8M forms a strata of Fe or Al on the surface of lignocellulose, which cause Fe or Al to come off and reduce available area. In case of alkali gas such as NH₄OH, 1M~ 8M of concentration is recommended. When the concentration of alkali gas is below 1M, it takes a long time to react, and replacement becomes difficult. When above 8M, the replacement reaction rapidly processes to reduce the amount of Fe or Al to be replaced. The suitable reaction time to fix Fe or Al is from 10 seconds to 10 minutes.

Hydrogen in OH⁻ attached to cellulose and lignin is substituted with Fe or Al as in the reaction formula below. Fe or Al is combined with the lignocellulose in the form of FeO or AlO. Finally, put the lignocellulose coupled with Fe or Al in the distilled water and then rinse out unreacted Fe or Al.

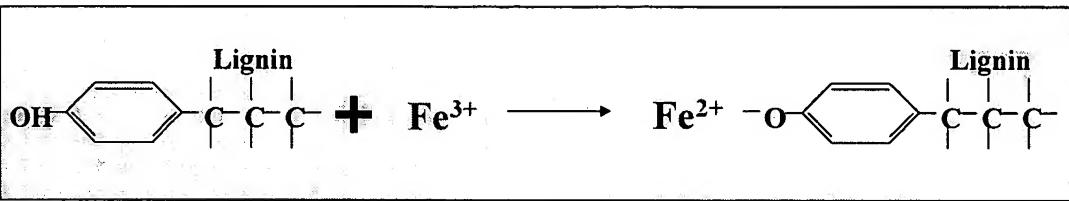
□Reaction Expression 1□



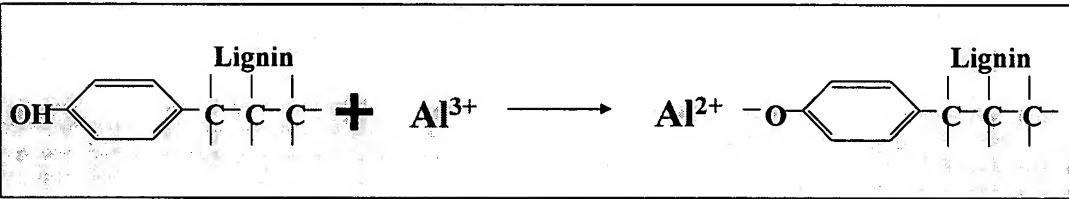
□Reaction Expression 2□



□Reaction Expression 3□



□Reaction Expression 4□



The lignocellulose media can be pelletized. The pelletizing method is as follows:

Roll a sheet of paper tightly until it makes a stick of proper diameter and paste the end of the paper with untoxic, unsoluble glue. Cut the rolled paper stick into suitable length. The diameter and length of the paper stick can be of the user's choice and can be of any diameter and length. The liquefied cellulose and liquefied timber can be pelletized.

Also, after coating lignocellulose surface with lignin, the lignin coated lignocellulose can be reacted with Fe or Al according to the manufacturing method above. Coating the lignocellulose surface one more time with lignin which is inside the lignocellulose can facilitate the substitution of Fe or Al. The following is the method of coating lignin.

Fill the digester with 250 ml of sulfite pulping waste liquor and put

lignocellulose media in it. After sealing the digester, raise the temperature to more than 110 °C over one hour. It causes lignin melted in the sulfite pulping waste liquor to condense on the surface of lignocellulose. The lignin which causes condensation reaction is coated onto the surface of lignocellulose. Hydrogen of OH- of the lignin coated lignocellulose can be substituted with Fe or Al by the same method above.

The following is a method to regenerate the above lignocellulose media.

Put the lignocellulose media with equilibrated absorption capacity into an alkali solution and shake it softly. The alkali solutions can be NaOH, KOH, Ca(OH)₂ and NH₄OH, and recommended one is NaOH solution. Alkali solution such as NaOH below 1% slows down the reaction. Five percentage of alkali solution is good enough for regeneration and so above 5% is inappropriate in terms of economics. Let the lignocellulose leave in the alkali solution for 1-60 minutes and wash it with water. Neutralize the lignocellulose by adding acid to water and let it react with NaOH. It restores the absorption capacity and can make it reusable. HCl, H₂SO₄ and HNO₃ can be used as acid and recommended acid is HCl.

Likewise, the lignocellulose can be pelleted, and pelletized media can be manufactured by the method described above.

It is recommended that the lignocellulose is regenerated with low concentration of NaOH. After the solution is evaporated, the phosphate enriched alkali fertilizer can be produced with the leftover. In this case, it can have additional zero discharged system.

The following is the detailed description of the invention by example.

Example 1

The experiment method of manufacturing nonpelletized lignocellulose media coupled with Fe by this invention is as follows:

First, dissolve FeCl₃ in the water and make solutions with different Fe concentrations of 0.01 M ~ 3.0 M and add HCl into each solution. The solutions were adjusted to HCl concentrations of 0.01M, 0.1M, 0.5M, 1.0M, 2.0M, 5.0M and then Fe was dissociated in solutions. To the solutions in which Fe was dissociated, add nonpelletized lignocellulose in the shape of a square with each side of 25mm, unit weight of 170mg and thickness of 1mm, and then let it absorb Fe. After that, dry it at a room temperature. After drying it, substitute H in OH- attached to cellulose and lignin with Fe by using 66% NH₄OH as a fixing solution. Finally, put the lignocellulose coupled with Fe in the distilled water and wash out unreacted Fe.

As a result, nonpelletized lignocellulose media is manufactured, in which Fe is coupled on the surface of lignocellulose in the form of iron oxide.

Example 2

The experiment method of manufacturing pelletized lignocellulose media coupled with Fe by this invention is as follows: First, to manufacture pelletized lignocellulose media, roll a sheet of paper tightly into a stick with diameter of 2mm and then paste the end of the paper with nontoxic and not water soluble glue. The tightly rolled paper stick is then manufactured into 5mm long pelletized media with its unit weight of 30mg. The rest of the experiment is the same as in the example 1 except that it uses pelletized media instead of nonpelletized lignocellulose media.

Example 3

The experiment method of manufacturing nonpelletized lignocellulose media coupled with Al by this invention is as follows: First, dissolve AlCl_3 in the water and make solutions with different aluminum concentrations of 0.01 M ~ 3.0 M and add HCl into each solution. The solutions were adjusted to HCl concentrations of 0.01M, 0.1M, 0.5M, 1.0M, 2.0M, 5.0M and then made into solutions in which Aluminum was dissociated. To the solutions with different aluminum concentrations, add nonpelletized lignocellulose in the shape of a square with each side of 25mm, and unit weight of 170mg and thickness of 1mm, and then let it absorb Aluminum. After that, dry it at a room temperature. After drying it, substitute H in OH- attached to cellulose and lignin with aluminum by using 66% NH_4OH as a fixing solution. Finally, put the lignocellulose coupled with aluminum in the distilled water and wash out unreacted aluminum.

As a result, nonpelletized lignocellulose media is manufactured, in which Aluminum is coupled on the surface of lignocellulose in the form of Aluminum oxide.

Example 4

The experiment method of manufacturing pelletized lignocellulose media coupled with Aluminum by this invention is as follows:

By using the same method as in the example 2, 5mm long pelletized lignocellulose media with unit weight of 30mg, diameter of 2mm was manufactured, and the rest of the experiment is the same as in the example 3 except that it uses pelletized media instead of nonpelletized lignocellulose media.

Example 5

The experiment method of manufacturing lignocellulose media coupled with Fe or Al after coating its surface with lignin by this invention is as follows: Fill the digester with 250 ml of sulfite pulping waste liquor and put lignocellulose media in it. After sealing the digester, raise the temperature to more than 110 °C over one hour. It causes lignin melted in the sulfite pulping waste liquor to condense. In condensation reaction lignin is coated onto the surface of lignocellulose. The rest of the experiment is the same as in the examples 1 or 4 except that it uses lignin coated lignocellulose.

Example 6

The experiment method and its results of comparing the absorption capacity of lignocellulose manufactured by this invention with that of counterpart sorbents are as follows: First, artificial wastewater is manufactured according to the following steps: Manufacture artificial wastewater by pouring 50ml of 10mg/l phosphoric acid solution made with distilled water and 50ml of 10mg/l phosphoric acid solution made with artificial sea water(Instant Ocean, Synthetic sea salt, Nitrate-Free, Phosphate-Free, Aquarium Systems Inc.) into the containers of 60ml.

And for CCA treatment(Copper, Chromium and Arsenic, the most common preservation method for wood), inject 1% CCA solution into wood in 25psi. Put the CCA applied wood in the distilled water and measure the concentration of the leachate which comes out after a certain period of time using ICP-Mass and finally dilute it to make 10mg/l arsenic solution. Pour 50ml of this solution into each of the 60ml containers to manufacture artificial wastewater.

Counterpart sorbents is manufactured as follows: PAC(Powder Activated Carbon), Fe(III) oxide, Al(III) oxide(a), Zn oxide(r), and Mn oxide which were used are particles with diameter of 100 mesh or more and all of these were Aldrich products.

For absorption experiment in the distilled water, 1g of counterpart sorbents, 1 nonpelletized lignocellulose media manufactured in the above example 1, 6 pelletized lignocellulose media manufactured in the above example 2 were put into the above 10mg/l phosphoric acid solution and 10mg/l arsenic solution, respectively. The experiment was conducted for 24 hours at a room temperature, shaking the solutions at 150rpm.

For absorption experiment in the artificial sea water, 1g of counterpart sorbents, 1 nonpelletized lignocellulose media manufactured in the above example 1, 6 pelletized

lignocellulose media manufactured in the above example 2 were put into the above artificial sea water of 10mg/l phosphoric acid solution. The experiment was also conducted for 24 hours at a room temperature, shaking the solutions at 150r.p.m. under the same conditions.

Figure 1 illustrates the results of the absorption experiment of nonpelletized lignocellulose media in the distilled water and artificial sea water by this invention and Figure 2 illustrates the results of the absorption experiment of pelletized lignocellulose media in the distilled water and artificial sea water. The following is the detailed explanation about them:

In terms of phosphate removal rates, the nonpelletized lignocellulose media by this invention has the removal rate of 90% in selective adsorption of PO_4^{3-} in the artificial wastewater and artificial sea water. The counterpart sorbents, on the other hand, had a much lower removal rate in adsorption experiments of PO_4^{3-} in artificial seawater. Therefore it has been revealed that the lignocellulose media by this invention can be applied in artificial sea water as well as in distilled water, and that its adsorption capacity (2.95mg/g, 2.0mg/g) is also very high.

Like nonpelletized lignocellulose media, pelletized lignocellulose media also removes phosphate in distilled water and artificial sea water absorption experiments and its absorption capacity (2.64mg/g, 2.1mg/g) is high. Therefore, it is confirmed that pelletized lignocellulose media can effectively remove phosphate.

In arsenic removal rates, the absorption capacity of counterpart sorbents was low in the artificial wastewater arsenic solution, but that of nonpelletized lignocellulose media was very high(3.1mg/g). Pelletized lignocellulose media, like nonpelletized lignocellulose media, also showed very high absorption capacity (3.0mg/g). In short, the arsenic absorption capacity of nonpelletized lignocellulose media and pelletized lignocellulose media have been shown to be 30 times as high as that of counterpart sorbents.

As indicated above, both nonpelletized lignocellulose media and pelletized lignocellulose media by this invention can be applied not only to the freshwater but also to the sea water and have very high phosphate or arsenic absorption capacity.

Example 7

The experiment method and its results to regenerate the lignocellulose media manufactured by this invention is as follows: When absorption capacity of nonpelletized and pelletized lignocellulose media was reduced, wash the nonpelletized lignocellulose media manufactured in the above example 1 and the pelletized lignocellulose media manufactured in the above example 2 in distilled water once and then let them react for ten minutes in the 0.01%, 0.05%, 0.1%, 0.5%, 1.0%, 2.0%, 5.0%, 7.0%, 10.0% NaOH solutions.

Wash again the above **nonpelletized** lignocellulose media and pelletized lignocellulose media two to three times in distilled water and then neutralize them using 1N HCl. Put the neutralized **nonpelletized** lignocellulose media and pelletized lignocellulose media into 50ml of the artificial wastewater of 10mg/l phosphoric acid solution and 10mg/l arsenic solution, respectively, which were made in the above example 6 and then conduct five times absorption experiments for 24 hours.

As a result, it was known that absorption capacity was restored to almost 100% in every experiment when the concentration of NaOH was 1.0 ~ 5.0%. The number of times of regeneration depends on the quality of paper, and lignocellulose media can be regenerated at least 10 times.

All the things above are the detailed explanation of the invention through examples, and they are for illustrations only. Therefore, they don't restrict the invention to themselves.

□Effects of the Invention□

The lignocellulose media coupled with Fe or Al, which is manufactured by this invention, has much higher absorption capacity than that of any commercialized absorption media, and so can effectively remove arsenic in the underground water and mine wastewater as well as phosphate in freshwater, wastewater and sewage.

It can provide a simple yet effective treatment method to point source pollution, and shows great success in removing phosphate or arsenic in case of non point source pollution, for which there have been no treatment methods.

Moreover, this invention uses only natural materials such as perennial plants (trees) and annual plants (Kenaf, rice straw and cotton) as lignocellulose media. Therefore, it is harmless to human body, has no possibility to cause the second pollution, and is very cost effective. And it can be greatly profitable in economic sense because the regeneration method of lignocellulose media coupled with Fe or Al by this invention can even restore its original absorption capacity, making it reusable semi-permanently.

□Patent Pending Range□

□Patent Pending Clause 1□

A method of manufacturing lignocellulose media coupled with Fe or Al follows the steps below: Step 1: Dissolve a chemical compound containing Fe or Al in the water, and then dissociate Fe or Al by adding acid. Step 2: Put the lignocellulose into the above solution and then make it absorb Fe or Al. Step 3: From the above lignocellulose which has absorbed Fe or Al, substitute Fe or Al for H in OH- attached to cellulose and lignin by using fixing solution or

fixing gas .

□ Patent Pending Clause 2 □

Regarding Clause 1, A method of manufacturing lignocellulose media coupled with Fe or Al, and the lignocellulose media is one of wood, paper or cotton.

□ Patent Pending Clause 3 □

Regarding Clause 1, A method of manufacturing lignocellulose media coupled with Fe or Al and the above lignocellulose is pelletized media. The pelletized media is made of a stick-shaped rolled sheet of paper using some glue.

□ Patent Pending Clause 4 □

Regarding Clauses 1 and 3, A method of manufacturing lignocellulose media coupled with Fe or Al and in its first step, the chemical compound containing Fe or Al is one of FeI_2 , FeCl_2 , FeCl_3 , FeBr_2 , FeBr_3 , FeF_2 , FeF_3 , $\text{Fe}_2(\text{SO}_4)_3$, $\text{Fe}(\text{NO}_3)_3$, FePO_4 , AlI_3 , AlCl_3 , AlBr_3 , AlF_3 , $\text{Al}_2(\text{SO}_4)_3$, $\text{Al}(\text{NO}_3)_3$ or AlPO_4 .

□ Patent Pending Clause 5 □

Regarding Clauses 1 and 3, A method of manufacturing lignocellulose media coupled with Fe or Al and in its first step, the acid to add is one of HCl , H_2SO_4 or HNO_3 solutions.

□ Patent Pending Clause 6 □

Regarding Clauses 1 and 3, A method of manufacturing lignocellulose media coupled with Fe or Al and in its second step 2, lignocellulose has its surface coated with lignin which is melted in the **sulfurous acid pulp wastewater**.

□ Patent Pending Clause 7 □

Regarding Clauses 1 and 3, A method of manufacturing lignocellulose media coupled with Fe or Al and in its second step 2, lignocellulose has additional step of drying it at a room temperature after putting the lignocellulose in the above solution and then making it absorb Fe or Al.

□ Patent Pending Clause 8 □

Regarding Clauses 1 and 3, A method of manufacturing lignocellulose media coupled with Fe or Al and in its method , the fixing solution or fixing gas is alkali fluid or alkali

gas.

□ Patent Pending Clause 9□

Regarding Clause 8, A method of manufacturing lignocellulose media coupled with Fe or Al and in its method, alkali solution or alkali gas is one of NaOH, KOH, Ca(OH)2 or NH4OH.

□ Patent Pending Clause 10□

A regeneration method of lignocellulose media coupled with Fe or Al and its method, the lignocellulose is made to **absorb phosphate or arsenic, and then react upon alkali fluid, and finally be neutralized with acid.**

□ Patent Pending Clause 11□

Regarding Clause 10, A method of manufacturing lignocellulose media coupled with Fe or Al and the above lignocellulose is pelletized media. The pellitzized media is made of a stick-shaped rolled sheet of paper using some glue.

□ Patent Pending Clause 12□

Regarding Clauses 10 and 11, A regeneration method of lignocellulose media coupled with Fe or Al and its method, the above alkali solution is of NaOH, KOH, Ca(OH)2 or NH4OH.

□ Patent Pending Clause 13□

Regarding Clauses 10 and 11, A method of regenerating lignocellulose media coupled with Fe or Al and in its method, the above acid is of HCl, H2SO4 or HNO3.

□ Patent Pending Clause 14□

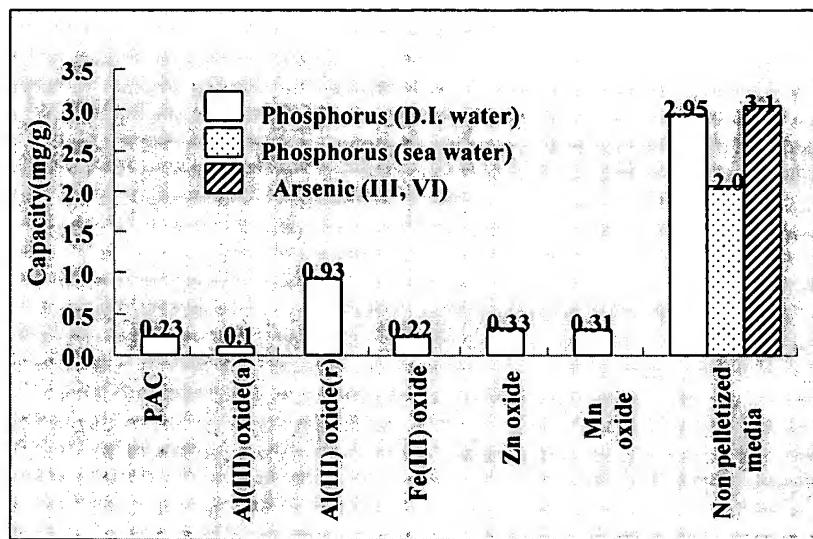
Lignocellulose media coupled with Fe or Al, which is manufactured by the method in the Clause 1 and used for water treatment to remove the **existing phosphate** in the sea water, freshwater, wastewater and sewage and the **exsiting arsenic** in the underground water and mine wastewater., and by doing so, which can be used for water resource.

□ Patent Pending Clause 15□

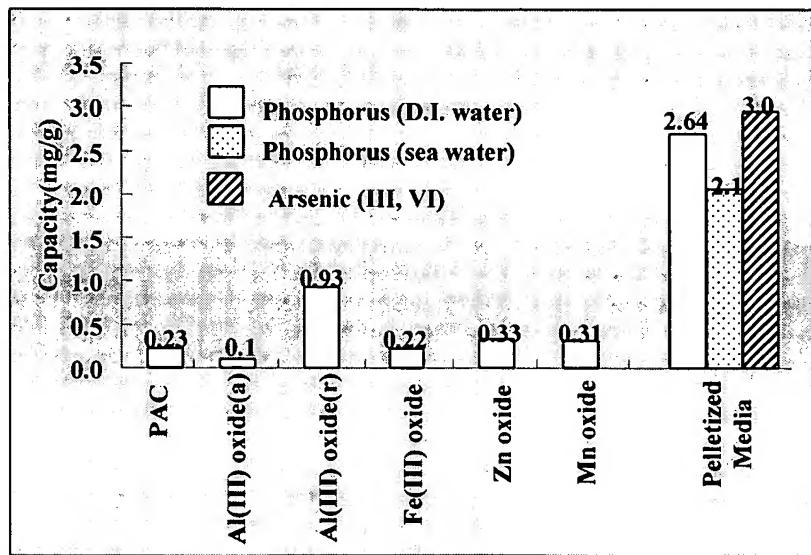
Regarding Clause 14, A method of manufacturing lignocellulose media coupled with Fe or Al and the above lignocellulose is pelletized media. The pellitzized media is made of a stick-shaped rolled sheet of paper using some glue.

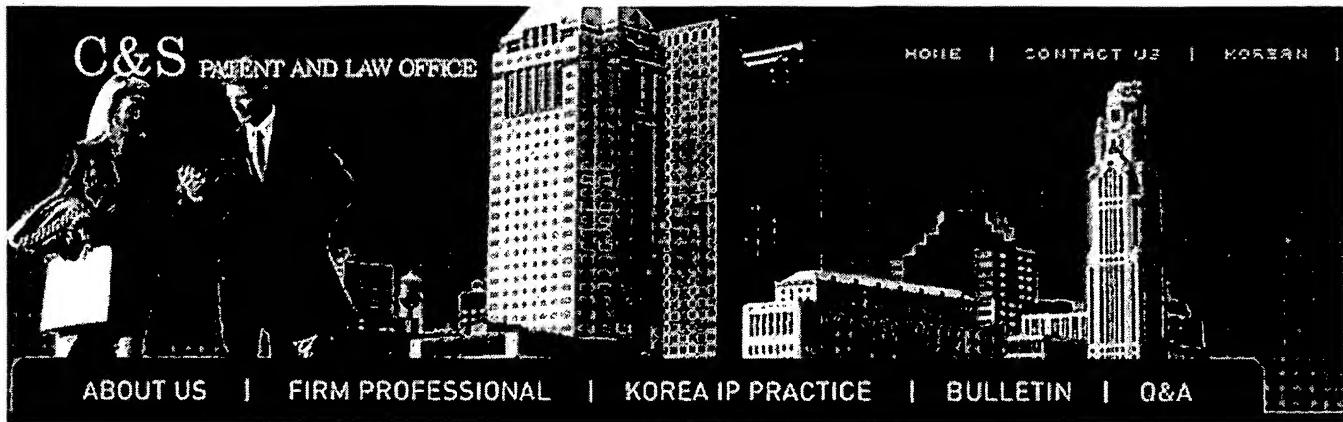
□Drawings □

□Figure 1 □



□Figure 2 □





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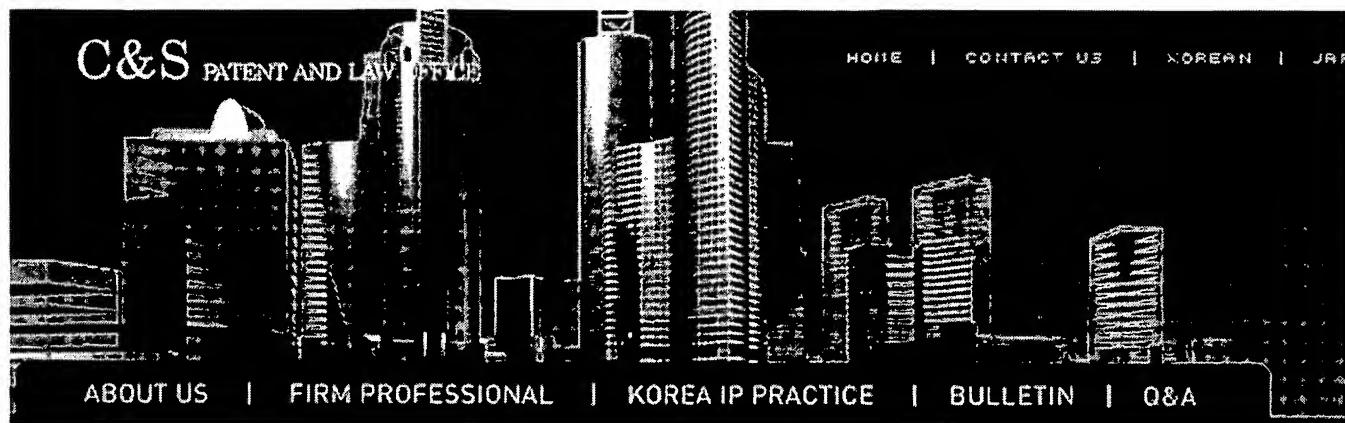
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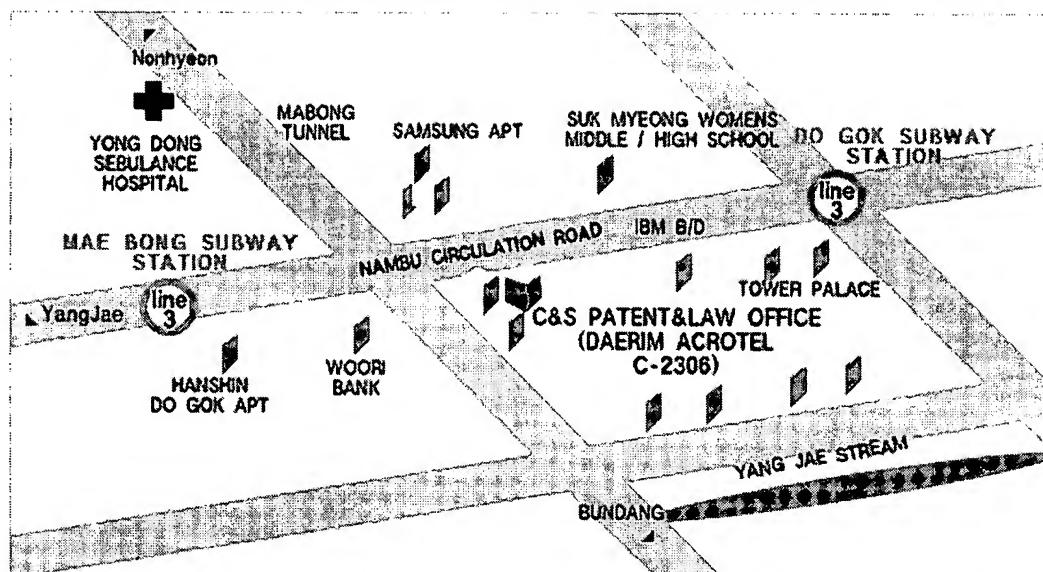
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We provide a full range of trademark portfolio planning services.

We conduct trademark searches and advise on trademark clearance, and enforcement. Our expertise extends to trademark-related commercial considerations such as labeling, packaging, and advertising to comply with various government regulations.

In the international arena, we are able to coordinate opposition, cancellation and infringement against conflicting trademark applications or registrations in nearly every jurisdiction of the world in order to enforce our clients' trademark rights.

Design

-We have significant experience in advising on the availability and registrability of designs and undertake all work necessary to procure registration and maintenance of these rights.

We provide design services that go beyond that received in mainstream firms, for example, utilizing the availability of similar designs in order to secure the strongest design property rights possible.

Our range of activities include counseling, searches, registrations, design monitoring, dispute and opposition proceedings, licensing as well as litigation in national and international matters.

Litigation

-We are experienced in enforcing intellectual property rights by means of litigation in all major areas of Intellectual Property Law.

We are particularly experienced in international patent litigation and have the resources to support our foreign clients through close contacts with leading intellectual property advocates throughout the world.

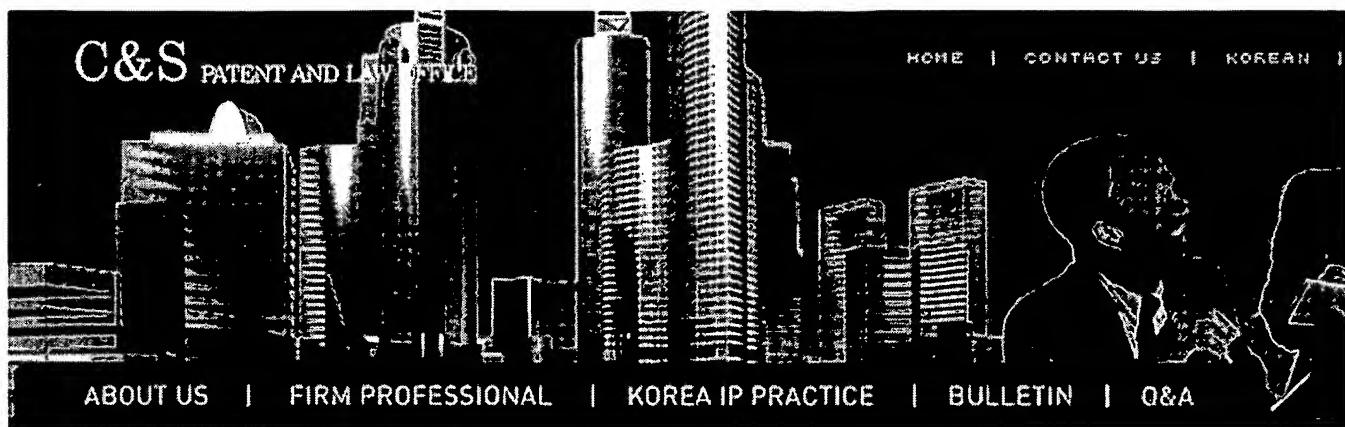
We evaluate the issues and strengths of our clients' positions, recommend the best counsel and foreign court procedure, and work closely with overseas counsel before and during an action.

Licensing & Consulting

-We have extensive experience in transactions relating to technology licensing and transfer, including information technology, biotechnology and various other industrial technologies. We take a multi-disciplined approach and utilize the resources of our experienced patent attorneys.



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Firm Professional

Won SON

- ▶ Won SON
- ▶ Young - Chae YOON
- ▶ Sang - Joon HAHM
- ▶ Seung - Yun YEOM
- ▶ Sung - Dong LEE
- ▶ Sung - Tae KIM
- ▶ Se - Ho NOH
- ▶ Byeong Hoon YOON
- ▶ Jeong - Hoon KIM
- ▶ Sung - Hwa LEE
- ▶ Hun KIM



He studied Semiconductor Engineering from the Graduate School of Industrial Studies, Soongshil University and has B.S. degree in Chemistry from Seoul National University.

He worked for Daewoo Corporation from 1977 to 1982 before joining C&S Patent and Law Office in 1982 and qualified as Patent Attorney in 1987.

He taught Intellectual Property Law at the Seoul National University of Technology from 1989 to 2001 and has been teaching Patent Law at the Graduate School of Law, Yonsei University since 2002.

He serves as a director of AIPPI, LES KOREA, KIPLA(Korea Intellectual Property Law Association) and KPAA(Korean Patent Attorneys Association) and a member of APAA.

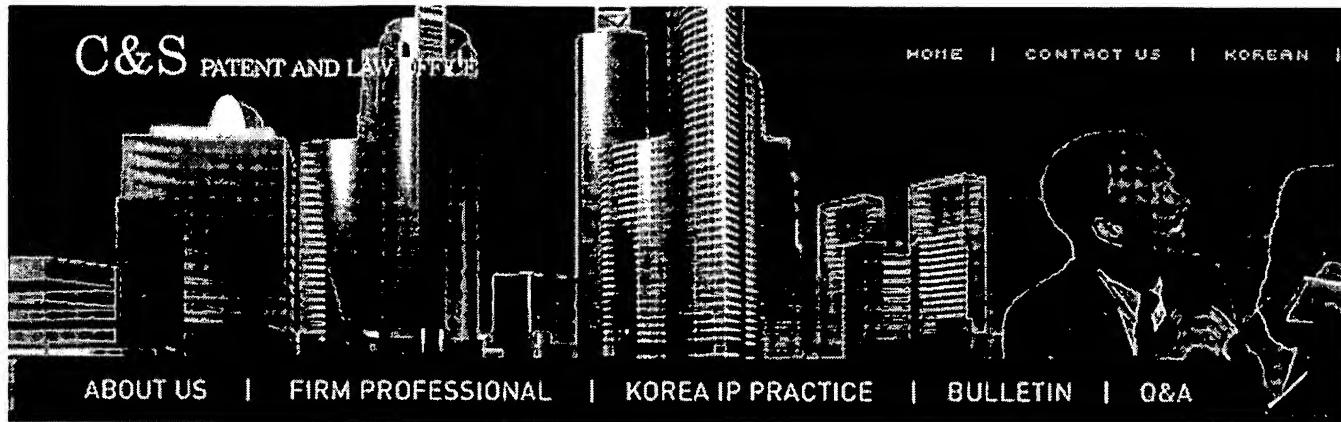
He was a member of the Advisory Committee for Patent Law Amendment in the KIPO(Korean Intellectual Property Office) and an Examiner of the Qualifying Examination to be a patent attorney.



wson@cnspat.com

C&S PATENT AND LAW OFFICE

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**Firm Professional****Sung - Hwa LEE**

- ▶ Won SON
- ▶ Young - Chae YOON
- ▶ Sang - Joon HAHM
- ▶ Seung - Yun YEOM
- ▶ Sung - Dong LEE
- ▶ Sung - Tae KIM
- ▶ Se - Ho NOH
- ▶ Byeong Hoon YOON
- ▶ Jeong - Hoon KIM
- ▶ Sung - Hwa LEE
- ▶ Hun KIM



She has B.S. degree in Environmental Engineering from Busan National University and qualified as a Patent Attorney in 2002.

She studied Intellectual Property at the International Intellectual Property Training Institute(IJPTI).

She joined C&S Patent and Law Office in 2003.

She specializes in mechanics and chemistry.

 shlee@cnspat.com

C&S PATENT AND LAW OFFICE

Recent Changes in Korean IP Laws - effective as of 2003-03-12 / 2003-04-10
C&S PATENT AND LAW OFFICE GENERAL INFORMATION

Copy of Contract between Juyoung and
C&S Patent & Law office on 8/28/03

委任契約書

委任者 : (성명) 김주영

(주소) 서울시 마포구 성산 1동 214-44번지

(주민등록번호 또는 법인번호) 640305-1001617

受任者 : 특허법인 C&S

위 당사자간의 위임계약에 있어 위 委任者를 甲, 위 受任者를 乙이라 칭하고 다음과 같이 계약을 체결한다.

제1조(委任事件)

甲은 乙에게 하기 위임사건에 관하여 乙이 변리업무를 수행함에 필요한 일체의 권한을 위임한다.

委任事件 : 특허출원 (명칭 : 철 또는 알루미늄 결합 셀프로즈 제조방법)

제2조(費用)

① 제1조의 위임사건 학수시 甲은 乙에게 다음을 지불한다.

대리인 수수료 : 1,824,200원 (부가세 10% 별도)

관 납 료 : 175,800원

합 계 : 2,000,000원

② 제1조의 위임사건 성공시 甲은 乙에게 다음을 지불한다.

대리인 수수료 : 1,500,000원 (부가세 10% 별도)

등 록 료 : 별도

등 록 세 : 별도

③ 상기 위임사건이 성공된 것으로 간주되는 시점(즉, 등록결정 또는 출원공고결정) 이후에 甲이 사건을 포기하는 경우에도 甲은 乙에게 제2항의 대리인 수수료를 지불한다.

④ 상기 위임사건 수행과 관련하여 제1항 및 제2항 기재 이외의 비용이 발생할 경우 甲은 乙에게 이를 별도로 지불한다.

제3조(費用不返還)

甲이 乙에게 지불한 수수료에 대해서는 乙의 절차진행이 있는 이후에는 반환청구를 하지 못한다.

제4조(費用支拂)

상기 위임사건을 수행함에 필요한 비용은 乙의 청구에 따라 甲은 신속히 지불하여야 한다. 만약 甲이 비용지불을 지체함으로써 乙의 위임사건 수행에 지장이 있는 경우 이로 인하여 발생한 손해에 대하여는 乙은 책임을 지지 아니한다.

제5조(資料 및 審類提供)

위임사건 수행에 필요한 자료 및 서류는 乙의 요구에 따라 甲은 신속히 제공하여야 한다. 만약 甲이 자료 및 서류제공을 지체함으로써 乙의 위임사건 수행에 지장이 있는 경우 이로 인하여 발생한 손해에 대하여는 乙은 책임을 지지 아니한다.

제6조(委任事件의 處理)

乙은 甲으로부터 상기 비용, 자료 및 서류 등을 송부 받은 경우 가능한 조속히 위임사건을 처리한다.

이상의 사항을 준수하고 후일의 증거로 삼기 위하여 본 계약서를 2통 작성하여 甲과 乙 각각 1통씩 보관한다.

2003년 8월 28일

甲 : 김주영



乙 : 특허법인 C&S

대표변리사 손 원



(담당자 : 이성화 변리사)


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From: "이성화" <shlee@cnspat.com>
To: "김 주영" <usdakim@yahoo.com>
Subject: 명세서 초안 수정본 첨부하였습니다.
Date: Fri, 29 Aug 2003 16:09:05 +0900

"E-mail 1"
 8/29/2003

특허법인 C&S

PATENT AND LAW OFFICE (135-971) 서울 강남구 도곡동 467-6 대륭마크로텔 2306호

www.cnspat.com

TEL : 02 8187 7151 ~ 9 FAX : 02 8187 7211 ~ 2 <악도>

안녕하십니까?

C&S 이성화 변리사 입니다.

추가해 주신 부분들을 반영하여서 명세서를 아래 첨부와 같이 수정하였습니다.

다시 한번 경도해주시고,

수정사항 또는 출원지시사항을 매일로 연락하여 주십시오.

(특허청 제출용 전자문서 파일을 MS워드로 전환하는 과정에서 약간의 형식상 이
상이 있을 수 있으니, 참고하시기 바랍니다.)

감사합니다.

변리사 이 성 화 shlee@cnspat.com

본 e-메일과 첨부서류에 기재된 모든 사항은 위 법인과 수신처 간의 기밀에 속하므로 외부로 누설되지
않도록 하여 주시고, 만일 잘못 누설된 경우 즉시 그 사실을 알려주시면 대단히 감사하겠습니다.

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.doc file

An e-mail from Korean patent lawyer (1)

(This is translation for the e-mail written in Korean.)
(I will fax this to you again soon.)

Hello

I am Sung-Hwa Lee, a patent lawyer in C&S patent and law office.

I complemented the patent specification according to the additions you gave me.

I attached the document file below.

Please review this document and e-mail me if you have any other change or complement on the application.

(It might have some differences in form in transferring from electronic file (form for Korea Industrial Property Office) to MS-file.)

Thank you.


[Print - Close Window](#)

From: "이성화" <shlee@cnspat.com>
To: "김 주연" <usdakim@yahoo.com>
Subject: 특허출원번호입니다.
Date: Wed, 17 Sep 2003 09:24:11 +0900

"E-mail 2"

특허법인 C&S

PATENT AND LAW OFFICE (135-971) 서울 강남구 도곡동 467-6 대림마크로텔 2306호

www.cnspat.com

TEL. 02-2137-7161 ~ 9 FAX. 02-2167-7211 ~ 2 <악도>

안녕하십니까?

C&S 특허법인 이성화 변리사입니다.

최종수정 지시사항을 반영하여 명세서를 수정하였으며.

9월 16일자로 특허출원하였습니다.

특허출원번호는 10-2003-64186호입니다.

주후 진행사항에 대해서는 다시 연락주시기 바랍니다.

항상 건강하시고, 행운이 함께 하시길 바랍니다.

감사합니다.

변리사 이 성 화 shlee@cnspat.com

본 e-메일과 첨부서류에 기재된 모든 사항은 위 법인과 수신처 간의 기밀에 속하므로 외부로 누설되지
않도록 하여 주시고, 만일 잘못 누설된 경우 즉시 그 사실을 알려주시면 대단히 감사하겠습니다.
The information contained in this e-mail and the attached sheet is intended only for
the personal and confidential use of the designated recipient. If you have received
this e-mail in error, please notify us immediately by return e-mail. Thank you!

An e-mail from Korean patent lawyer (2)

(This is translation for the e-mail written in Korean.)

(I will fax this to you again soon.)

Hello

I am Sung-Hwa Lee, a patent lawyer in C&S patent and law office.

I complemented the patent specification according to your final request.

It was filed on Sept. 16th, 2003.

The filing number is 10-2003-64186.

Please give me notice about further processes on that.

Take care and good luck to you.

Thank you.

ASSIGNMENT OF RIGHTS

WHEREAS: Dr. Ju Young Kim a Republic of Korea citizen residing at 7203 Midtown Road, #101, Madison, WI 53719, (hereinafter referred to as Assignor) has invented certain new and useful improvements in a manufacturing method of lignocellulose media coupled with FE or AL for which an application for a United States Patent was filed on January 31, 2004, application Number 10/708001 and an application for patent was filed in the Republic of Korea under application No. KR10-2003-64186 on September 16, 2003 (hereinafter referred to as Invention);

WHEREAS, subject to the further provisions of this Assignment, H₂O Technologies, LLC, a limited liability corporation organized under the laws of the State of Georgia and having a place of business at 1007 North Patterson Street, Valdosta, Georgia 31601, (hereinafter referred to as Assignee) wishes to acquire all right, title and interest to the Invention in the United States, its territorial possessions and in all regional patent granting authorities and foreign countries;

WHEREAS, Assignee represents and covenants that he has full and unencumbered ownership of all right, title and interest to the Invention in the United States, its territorial possessions and in any and all regional patent granting authorities and foreign countries and;

WHEREAS, Assignee wishes to use the Invention in its business activity.

NOW THEREFORE, To All Whom It May Concern:

Be it known that in consideration for the payment by Assignee to Assignor of the sum of U.S. Ten Dollars (US \$10.00), the receipt of which is hereby acknowledged, and for other good and valuable consideration, Assignor hereby sells, assigns and transfers to Assignee, its successors, legal representatives and assigns the full and exclusive right, title and interest to the Invention in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries, to all Letters Patent or similar legal protection in the United States, its territorial possessions and in all regional patent granting authorities and in all foreign countries to be obtained for the Invention through all United States Patent application Number 10/708001 or Republic of Korea patent application No. KR 10-2003-64186, or both, or any continuation, division, renewal, substitute or reissue thereof or any legal equivalent thereof including but not limited to utility models, industrial models, designs and the like, and further includes any and all improvements or inventions related in any way to the Invention.

All right, title and interest to the Invention conveyed through this instrument is subject to reversion to the Assignor without further act or deed if the Assignee is dissolved in accordance with the provisions of the "Operating Agreement of H₂O Technologies, LLC," entered of even date herewith, or upon failure of the Company to make profits in excess of \$100,000 per year by the 5th year of operation.

ASSIGNOR hereby authorizes the Commissioner of Patents of the United States of America and any Official of any regional patent granting authority or of any country or countries foreign to the United States of America whose duty it is to issue Letters Patent or the legal equivalent thereof for the Invention to the Assignee, as assigned of the entire right, title and interest in, to and under the same for the sole use and benefit of the Assignee, its successors, legal representatives and assigns in accordance with the terms of this instrument.

ASSIGNOR hereby further covenants and agrees that the Assignee, its successors, legal representatives, or assigns, may apply for regional and foreign Letters Patent on the Invention and claim the benefits of the International Convention, and that I will, at any time, when called upon to do so by the Assignee, its successors, legal representatives, or assigns, communicate to the Assignee, its successors, legal representatives, or assigns, as the case may be, any facts known to me respecting the Invention, and execute and deliver any and all lawful papers that may be necessary or desirable to perfect the title to the Invention, the applications and the Letters Patent in the Assignee, its successors, legal representatives and assigns, and that if reissues of the Letters Patent or disclaimers relating thereto, or divisions, continuations, or refiling of the applications, or any thereof, shall hereafter be desired by the Assignee, its successors, legal representatives, or assigns sign all lawful papers, make all rightful oaths, execute and deliver all such disclaimers and all divisional, continuation and reissue applications so desired, and do all lawful acts requisite for the application for such reissues and the procuring thereof and for the filing of such disclaimers and such applications, and generally do everything possible to aid the Assignee, its successors, legal representatives and assigns, to obtain and enforce proper patent protection for the Invention in all countries and regional patent granting authorities, and without further compensation but at the expense of the Assignee, its successors, legal representatives and assigns.

Assignor's signature: Ju young Kim
First Name Middle initial Last Name

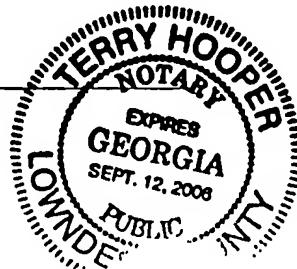
Citizenship: REPUBLIC OF KOREA

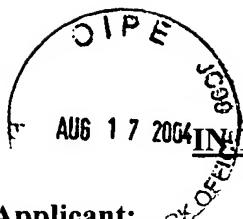
IN WITNESS WHEREOF, I have hereunto set my hand and affixed my seal this 30th day of April, 2004.

STATE OF GEORGIA
COUNTY OF LOWNDES

On this 30th day of April, 2004 before me, the undersigned authority, personally appeared to me known and known to me to be the individual who is described in and who executed the foregoing Assignment, and who duly acknowledged to me that he executed the same as his own voluntary act and deed for the uses and purposed therein specified.

Terry Hooper
Notary Public





AUG 17 2004 IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Ju Young Kim

Examiner: TBA

Application No.: 10/708,001

Filed: January 31, 2004

Art Unit: 1754

For: Lignocellulose-based anion-absorbing medium (LAM) and process for making and using same for the selective removal of phosphate and arsenic anionic contaminates from aqueous solutions

ASSOCIATE POWER OF ATTORNEY

Undersigned counsel was granted power of attorney to prosecute the above-identified patent application on May 13, 2004, which power of attorney was filed in the United States of Patent and Trademark Office of even date therewith.

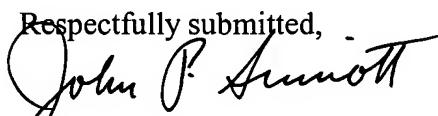
Undersigned counsel hereby appoints as associate counsel in this matter:

Patricia Smith King, Ph.D., Esq.
Registration No. 41,899

for the specific purpose only for filing Petitions for a Retroactive License, a License for Foreign Filing and associated documents as required.

All correspondence in this matter is to continue to be sent to undersigned counsel at his address of record in this matter:

John P. Sinnott, Esq.
Langdale & Vallotton, LLP
P.O. Box 1547
1007 N. Patterson Street
Valdosta, Georgia 31603
Telephone (229) 244-5400
Facsimile (229) 244-5475

Respectfully submitted,

John P. Sinnott
Registration No. 21,001

Date: August 12, 2004
Langdale & Vallotton, LLP
Post Office Box 1547
1007 North Patterson Street
Valdosta, GA 31603-1547
P:(229) 244-5400 F:(229) 244-5475